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ABSTRACT

The social and psychological effects of rapid technological advancement in the computer industry is the subject of this paper, which focuses on the concerns of people with non-technical backgrounds. It describes the career series, High Tech for Non-Technical People, created by the Georgia State University Career Development Center. The three workshops that form the series are outlined. They are: Overcoming Computer Anxiety or Learning to Love your Computer; The High Tech Industry: Where It Is and Who It's Hiring; and Jobs in High Tech for Non-Engineers and Other Smart People. Guidelines for promoting a successful program are presented. In addition, the appendices contain handouts from each workshop, covering such topics as selecting a home computer, choosing a training program, a profile of the hi tech industry in Georgia, networking, expanding career options, and a guide to non-technical occupations in the computer industry. (JAC)

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HIGH TECH AND THE UPWARD MOBILITY OF NON-TECHNICAL PEOPLE

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HIGH TECH AND THE UPWARD MOBILITY OF NON-TECHNICAL PEOPLE

> "The dawn of this new [technological] civilization is the single most explosive fact of our lifetime.... To say the changes we face will be revolutionary, however, is not enough. Before we can control or channel them, we need a fresh way to identify and analyze them. Without this we are hopelessly lost."
>
> (Toffler, 1980)

Computers and computer related technologies are affecting our lives in many subtle and not so subtle ways. Any number of measures can be used to gauge these effects. The most prevalent measures relate to the size and growth rate of the computer industry itself. Since World War II alone, the industry has grown from nothing to one that sold over 500,000 computers in 1982 (Honeywell, 1983). Data Resources, Inc., a California research firm, predicts that the computer industry is likely to be the largest industry in the world by the year 2,000 (Time, 1983).

Despite the prevalence of statistics on size and growth rates of the computer industry, these figures are poor indicators of the social and psychological impacts. Of greater significance is the rapid pace of technological developments within the industry. The increasing speed of computations, the decreasing size of electronic components and the reduced cost of equipment are affecting equally rapid changes in the environments in which they are used. These factors explain in part why the introduction of computers has continued unabated over the last few years - a trend that is not expected to reverse itself. Such proliferation makes it difficult to identify any segment of society that is not either directly or indirectly affected by the use of computers.

Technological change, like any change, is a double edged sword - the embodiment of both danger and opportunity. For those people with non-technical backgrounds, the sword may appear singularly dangerous due to a long standing avoidance of anything mathematical, scientific or mechanical. Old fears and old failures can lead to resistance toward technological change based on those associations alone. However, a pre-existing math or science anxiety is probably one of the easier sources of resistance to overcome as computers become simpler to use and instruction manuals become easier to understand.

There is a great deal of speculation about a future generation of "haves" and "have nots" - those with computer knowledge and those without it. For those segments of the population who are already disadvantaged due to a lack of technical skills, this prediction is frightening. Computers are viewed as yet one more means of excluding non-technical people from full participation in the job market and society as a whole. The question then arises as to whether advancing technology will be used to further isolate men from women, rich from poor, black from white and young from old, or whether it will be used to fulfill the promise of increased human dignity and cooperation.

For many non-technical people advancing technology presents a major obstacle to overcome on the road to career success. Will they self-select themselves out of the running for tomorrow's best jobs because they believe they are reserved for the math and science whizzes? Will they view themselves as too technologically disadvantaged to compete as equals in the emerging computer age?

In response to the growing concerns of non-technical people regarding their futures, the career series "High Tech For Non-Technical People" was created by the Georgia State University Career Development Center. The series consists of three workshops which are offered on three consecutive evenings each month. The workshops that comprise the series are described as follows:

Overcoming Computer Anxiety or Learning to Love Your Computer

The first evening's workshop includes an introduction to the micro computer and an examination of the process of change. Emphasis is on learning computer basics as well as preparing participants for technological change.

Each participant receives an information packet containing the following handouts which are included in Appendix A.

Selecting a home computer
Choosing a "hands on" training program
Parts of the computer and glossary of terms

The High Tech Industry: Where It Is and Who It's Hiring

The second workshop profiles the high tech industry on both the local and national levels. Participants explore economic trends, employment outlooks, major products, services and hiring practices within the industry.

Each participant receives an information packet containing the following handouts which are included in Appendix B.

Profile of the High Tech Industry in Georgia
Networking
Information Interviewing

Jobs in High Tech for Non-Engineers and Other Smart People

The third workshop focuses on expanding the employment options of non-technical people who wish to pursue careers in the high tech industry. Participants explore a variety of nontechnical occupations within the high tech field. They also learn how to apply strategies such as networking and information interviewing to their job search.

Each participant receives an information packet containing the following handouts which are included in Appendix C.

Expanding Your Career Options to Include the High Tech Field
Major Catagories of Computer Specialists and What They Do
Guide to Non Technical Occupations in the Computer Industry

The series was first offered in July, 1983 as a pilot program and attracted thirty participants. Since that time, enrollment has jumped to over one hundred people per month and shows no signs of decreasing. Requests from women's groups, business organizations and academic institutions have resulted in the series being adapted to the needs of special populations. For example, an additional workshop entitled "High Tech and Its Impact on the Upward Mobility of Women" has been developed for use with that audience as have special workshops for managers, counselors and educators.

The series attracts a variety of people. The majority of participants in the workshop on "Overcoming Computer Anxiety" are new and non-computer users. They are curious about computers and are interested in acquiring a basic understanding of how they function. Those attending the workshops on "The High Tech Industry in Atlanta" and "Jobs in High Tech" have computer related career aspirations. Most of the participants are career changers who are looking for ways to apply their existing experience to the high tech field. The majority have backgrounds in non-technical areas such as liberal arts, education and the social sciences where job opportunities are limited and low paying.

SUMMARY

The major challenge in conducting a career series of this kind is to provide current and accurate information. The content requires continual revision and updating in order to keep pace with the rapidly changing high tech field. Organizations such as the Chamber of Commerce, the Advanced Technology Development Center, the Department of Industry and Trade, the Bureau of Labor Statistics and the Industrial Development Center monitor the high tech economic and employment climate for the State of Georgia. They are valuable sources of information. The popular press is also an important resource for identifying current issues and events. Local academic institutions as well as private industry provide access to speakers, literature and equipment used in the series.

Although the career series "High Tech for Non-Technical People" is specific to the community served by Georgia State University, it can be adapted to any geographic location or population. The key to modifying the workshop content lies in the utilization of regional information resources such as local Boards of Trade, Chambers of Commerce, Business Bureaus and Newspapers. The key to program participation rests with identifying populations that are in need of high tech career information and marketing directly to them. A mass mailout to local career centers, academic institutions, churches, social clubs and business organizations alerts potential referral sources to your program. Media advertising reaches the greatest number of self referrals.

Educators do have a part to play in the emerging computer age as providers of information and as facilitators of change. They also have a responsibility to be informed about the current issues facing society and the profession - not the least of which is the widespread concern about unemployment associated with advancing technology.

As yet, no one is certain just how advancing technology will change the world - only that it will change. The successful people of tomorrow will identify the potential dangers inherent in advancing tehcnology and do what they can to minimize them. They will also identify the potential opportunities and do what they can to maximize them.

About the author:

Linda Kammire is program director of the Career Development Center at Georgia State University where she is completing her Ph.D. in human resource management. Her dissertation explores the social and psychological impacts of computers on people and organizations.

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Appendix A

Handouts

Overcoming Computer Anxiety or Learning to Love Your Computer

SELECTING A HOME COMPUTER

1. Look at as many models as possible, but realize there are currently over 150 models of computers on the market.

2. Consider the amount of memory capacity you will need for the tasks you you will be performing with the computer-home use computers usualy range from 4K to 64K of memory.

3. Check out the disk capacity available (back up information storage) since some disks can only store data on one side.

4. Check out the display capacity of the monitor (for word processing 80 columns is best). Also consider the monitor tint and whether you want a glare or non-glare screen.

5. Find a keyboard that is comfortable and has the features you desire.

6. Know what program languages the computer will handle and whether they suit your needs.

7. Can the computer system be expanded or upgraded as your needs change?

8. What software is available for each model of computer and is the documentation complete and easy to understand? Is it "user friendly?" Can you try out software before purchasing it?

9. Comparison shop--prices and available features vary widely. Is a warranty included?

10. Where is the nearest service center for the various models and is assistance available? Is training available? Is there a "users" club nearby?

11. Consider leasing a computer instead of buying one.

12. Do you really <u>need</u> a computer or will it soon become a dust collector?

ADDITIONAL CONSIDERATIONS:

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_____

_____

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HOW TO CHOOSE A "HANDS ON" TRAINING PROGRAM

Finding a "hands on" training program which will best meet your needs is a formidable task. Research and planning are the keys to discovering the program that is right. In researching programs, you should look into as many of the following items as possible:

How much will it cost including all factors: books, application fee, etc? Although this is the central concern for all students, you should not forget that cost must be assessed in terms of outcome. Tuition costs, no matter how reasonable, are a waste if they do not pay for skills training which leads to a placement which you are satisfied with.

What is the schedule of classes, holidays, etc.? Do they have both full-time and part-time programs? Do they provide any job placement assistance to the part-time student who must earn all or part of his/her tuition?

Is the school accredited? If it is not, you will not be eligible for state or federal financial aid.

Is the school licensed by the State Department of Education?

Tour the facilities. What is the quality of the physical plant? Do the staff appear professional?

Get an application for admission and one for financial aid. Do they have an endowment of their own for financial aid? Study any brochures the school provides. Does the school have an open admissions policy? If they require a high school diploma or G.E.D., what types and amounts of work experience will they accept in lieu of these documents?

Do the courses and equipment meet industry standards? Does the training facility emulate a private sector environment? The term "entry-level" can mean many things; what does it mean to this school in terms of training students? What types of private sector positions does their entry-level training qualify a graduate for?

What are the teachers' backgrounds? How much experience have they had in industry and how much in teaching?

Does advanced course work depend on your purchasing equipment from the school?

On the average, how many hours of homework are assigned per week?

What is the average class size? How many hours per week are spent in a lab? What hours are the labs open for student use? If possible, sit in on a class and/or lab session and speak to students to get their opinions of the training. Be wary of speaking only to students whom the school's administrators designate for that purpose.

Does the school offer field internships within the private sector during the training period? Remember, these types of placements provide valuable experience for inclusion on a resume and often interns are hired by their field placement company following graduation.

What type of placement assistance do they offer? What is the average starting salary of graduates? Get the names of businesses and managers who have hired graduates. Call employers to determine their opinion of the graduates. Be wary of schools which tell you, "ninety-five per cent of our last year's graduates found the employment of their choice." Get the names of alumni whom you can call and determine if these claims are valid. Find out from graduates just how much help the school's placement office offered them.

How many students drop out of the program every year? What is the school's reimbursement policy for early withdrawal? Make sure that you have this in writing. Can you get the names and numbers of a few dropouts and call them to see why they withdrew?

If you will be driving to school is there any space for parking? What is the cost? If you will be using public transportation do the bus and train schedules make it possible to arrive at classes promptly?

Additional Considerations:

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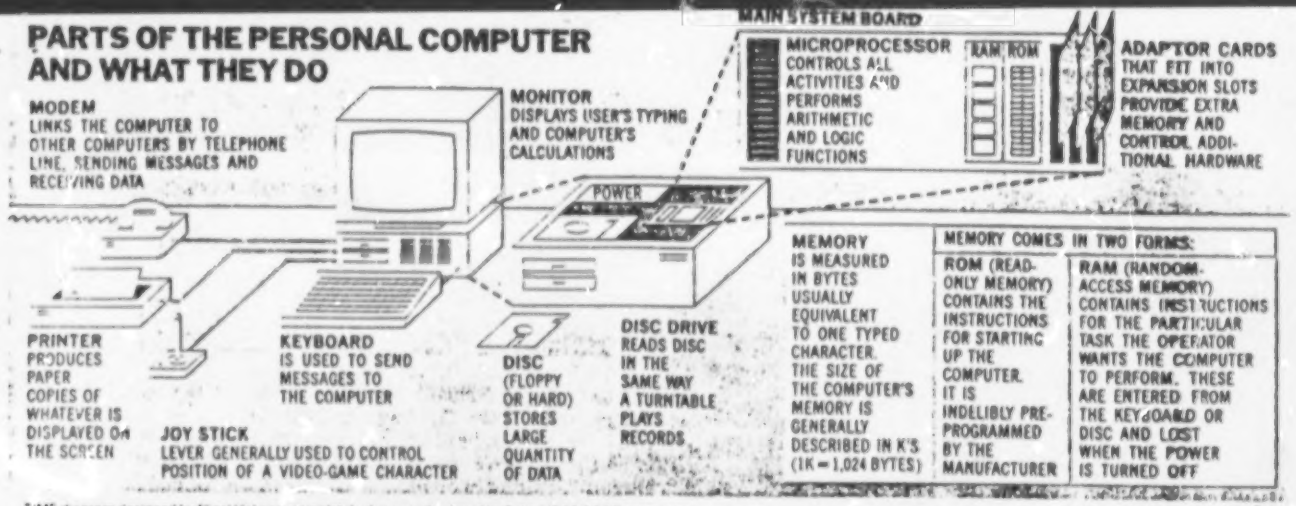
Adapted from: High Tech Revealed
New Environments for Women, 1982.


PARTS OF THE PERSONAL COMPUTER AND WHAT THEY DO
MODEM
LINKS THE COMPUTER TO OTHER COMPUTERS BY TELEPHONE LINE, SENDING MESSAGES AND RECEIVING DATA
MONITOR
DISPLAYS USER'S TYPING AND COMPUTER'S CALCULATIONS
MAIN SYSTEM BOARD
MICROPROCESSOR
CONTROLS ALL ACTIVITIES AND PERFORMS ARITHMETIC AND LOGIC FUNCTIONS
RAM ROM
ADAPTOR CARDS
THAT FIT INTO EXPANSION SLOTS PROVIDE EXTRA MEMORY AND CONTROL ADDITIONAL HARDWARE
POWER
PRINTER
PRODUCES PAPER COPIES OF WHATEVER IS DISPLAYED ON THE SCREEN
KEYBOARD
IS USED TO SEND MESSAGES TO THE COMPUTER
JOY STICK
LEVER GENERALLY USED TO CONTROL POSITION OF A VIDEO-GAME CHARACTER
DISC
(FLOPPY OR HARD) STORES LARGE QUANTITY OF DATA
DISC DRIVE
READS DISC IN THE SAME WAY A TURNTABLE PLAYS RECORDS
MEMORY
IS MEASURED IN BYTES USUALLY EQUIVALENT TO ONE TYPED CHARACTER. THE SIZE OF THE COMPUTER'S MEMORY IS GENERALLY DESCRIBED IN K'S (1K = 1,024 BYTES)
MEMORY COMES IN TWO FORMS:
ROM (READ-ONLY MEMORY) CONTAINS THE INSTRUCTIONS FOR STARTING UP THE COMPUTER. IT IS INDELIBLY PRE-PROGRAMMED BY THE MANUFACTURER
RAM (RANDOM-ACCESS MEMORY) CONTAINS INSTRUCTIONS FOR THE PARTICULAR TASK THE OPERATOR WANTS THE COMPUTER TO PERFORM. THESE ARE ENTERED FROM THE KEYBOARD OR DISC AND LOST WHEN THE POWER IS TURNED OFF
TIME diagram designed by Nigel Holmes, completely drawn and colored by Scitex/CAS 2000 computer
Time, Jan. 3, 1983

HARDWARE: The parts in a computer system (as seen above)

PERIPHERALS: Any device that connects to and is controlled by the computer such as the terminal, the printer, the modem
Also called "components" or "hardware"

SOFTWARE: The pre-packaged programs that tell the computer to perform certain tasks
Example: games, accounting packages

DOCUMENTATION: Software or hardware manuals

MACHINE LANGUAGE: The internal language of a computer as represented by a sequence of binary numbers - 0's and 1's
BIT - refers to one of the two binary states (0 or 1)
they are usually grouped for easy manipulation into groups of 8
BYTE - a group of bits, usually 8, used to represent an alphanumeric character (letter or number)
KILOBYTE - term used to denote 1024 bytes or 1K
MEGABYTE - term used to denote one million bytes or 1M

ASSEMBLY LANGUAGE: Machine language that is translated into mnemonic codes which are easier to use than machine language

USER LANGUAGE: Easiest language for the user to learn in order to communicate with the computer
The computer converts user language into machine through use of a COMPILER
Examples: BASIC, FORTRAN, LOGO, ADA, COBOL, PASCAL

INPUT/OUTPUT: The paths by which information enters the computer system and leaves the system

BUG: Any defect or malfunction in the hardware or software

BOOT: To load a program into the computer

DUMP: To unload a program from the computer

CHIP: An integrated circuit etched on a small piece of silicon

TO ACCESS: To gain entry to data that is stored in the computer

TO FORMAT: To organize or structure data

TO INTERFACE: To connect a computer and its peripherals with the outside world

BEST COPY AVAILABLE

Appendix B

Handouts

The High Tech Industry: Where It Is and Who It's Hiring

PROFILE OF THE HIGH TECH INDUSTRY IN GEORGIA

INDUSTRY	PRODUCTS	HIRING AREAS	PROJECTED JOB OPENINGS
		Electronics	1980-2000
Computers/ Computer services	Hardware: terminals, printers, modems, monitors, memory boards, disk drives, records, tapes, electronics Software: videogames, graphics, speciality application programs, education, medicine, finance, business etc. Support Services	Data input, programming (system and application) Publications Furniture and office design Analysts (data, systems) Hardware development and operation Software development and application Service, sales and marketing Training and education Documentation, Consulting, Security	123,940 Current Number of Employees: 9,500
AVIONICS	Planes, Space Vehicles, Guided Missles, Propulsion Units, Aircraft parts, Weapons	Defense, Transportation Instrumentation, Communication Systems, Space exploration	26,500 Current Number of Employees: 13,800
BIOLOGICAL/ MEDICAL ENGINEERING	Medical devices pacemakers, dialysis machines Drugs -interferon, insulin Artificial limbs, organs Diagnostic instruments	Research Genetics Prosthetics Life Support Systems Rehabilitation	3,450 Current Number of Employees: 150
ROBOTICS/ AUTOMATION	Robots Computer Assisted Design Computer Assisted Manufacturing	Artifical Intelligence Research, Applications, Software Operation, Maintenance	19,895 Current Number of Employees: 2,000
TELECOMMUNICATIONS	T.V.s, Telephones Video Equipment Satellites Film Radio	Media Specialties, Video tapes, Information transfer, Monetary transfer, Teleconferencing, Satellite development Weapon development	89,015 Current Number of Employees: 5,800
PHOTONICS	Laser Equipment Laser instruments-amphlification of li[illegible] by stimulated emission of radiation	Optics Surgery Construction Defense Communication	10,425 Current Number of Employees: 400

Adapted from: Research Atlanta Report, May, 1983
"High Technology in Metropolitan Atlanta"

NETWORKING

1. THINK OF ALL THE PEOPLE YOU KNOW -- THEY ARE YOUR EXISTING NETWORK:

   -FRIENDS, RELATIVES, COLLEAGUES, CHURCH MEMBERS, CLUB MEMBERS, FORMER TEACHERS, CLASSMATES, BOSSES, ACQUAINTANCES ETC.

2. LET THEM KNOW THAT YOU ARE CONSIDERING MAKING A CAREER CHANGE

3. IDENTIFY SPECIFIC WAYS THESE PEOPLE MAY BE HELPFUL TO YOU IN YOUR JOB SEARCH:

   -INFORMATION
   -REFERRALS
   -FEEDBACK

4. IDENTIFY SHORTCOMINGS IN YOUR NETWORK--ITS LIMITATIONS

5. DECIDE WHAT YOU NEED TO DO TO EXPAND YOUR NETWORK:

   -ASK EXISTING MEMBERS WHO THEY KNOW
   -JOIN MORE ORGANIZATIONS-ESPECIALLY THOSE THAT REPRESENT YOUR CAREER INTEREST AREA IE: "WOMEN IN COMMUNICATIONS"

ADDITIIONAL TIPS:

INFORMATION INTERVIEWING

1. CONTACT A KEY PERSON IN AN ORGANIZATION - SOMEONE WHO IS LIKELY TO HAVE THE INFORMATION YOU WANT.
2. ASK FOR 20 MINUTES OF THIS PERSON'S TIME
3. BRIEFLY EXPLAIN TO THIS PERSON THAT YOU ARE RESEARCHING A PARTICULAR ORGANIZATION OR OCCUPATION AND YOU THOUGHT HE/SHE COULD PROVIDE YOU WITH SOME INFORMATION.
4. ARRANGE TO MEET AT THIS PERSON'S OFFICE-NOT YOURS.
5. RESEARCH YOUR TOPIC CAREFULLY BEFORE MEETING WITH THIS PERSON SO AS TO MAKE A GOOD IMPRESSION
6. DO NOT ASK FOR A JOB, BUT SHARE INFORMATION ABOUT YOUR EXPERIENCE, WORK VALUES, CONCERNS--ASK FOR ADDITIONAL KEY PEOPLE
7. STICK TO THE 20 MINUTES UNLESS THE PERSON YOU'RE INTERVIEWIEWING EXTENDS THE TIME
8. WRITE A THANK YOU NOTE TO THE PERSON AFTER YOUR MEETING

ADDITIONAL TIPS:

Appendix C

Handouts

Jobs in High Tech for Non-Engineers and Other Smart People

EXPANDING YOUR CAREER OPTIONS TO INCLUDE THE HIGH TECH FIELD

Somewhere in between the extremes of "waiting it out until this fad passes" and "changing fields completely" are several options for making yourself more employable in the high tech industry. Listed below are some suggestions.

1. Modify your "meat and potatoes" thinking
   Writers don't just work in publishing firms--they also work in industry, government, educational and high tech settings.
   Consider settings other than those normally associated with your field of interest.

2. Be flexible in your geographic and salary requirements
   There are legitimate reasons not to relocate or take a cut in pay, but examine your motives to be sure they are not a result of fear, laziness or convenience.

3. Break the habit of thinking in "hierarchical structures"
   Examine job functions and don't restrict yourself to the same job titles as those you've always held. Lateral career moves can often pave the way for increased job satisfaction and advancement.
   Consider becoming a member of a project team.

4. Think in terms of your assets, not your liabilities
   Concentrate less on what you lack and more on what you have to offer.
   Lack of technical knowledge may be compensated for by experience in another field. You can bring with you a broad perspective and evidence of an ability to learn.

5. Take stock of skills you already have
   These are your transferable skills-the things you do well that you take with you to any job situation.
   They may be general: organizational skills, leadership skills, management skills
   They may be specific: supervised 10 employees, organized a fund raising campaign, increased profits by 10%

6. Increase your employability through education and training
   Make it a point to familiarize yourself with the high tech industry as it exists in your community.
   Get some "hands on" experience in the operation of the computer.
   Take advantage of the computer literacy courses offered through voc-tech schools, colleges and adult education programs in your community.

7. Consider a low tech career in a high tech industry
   Here are some settings to consider: computer hardware companies and their retailers, computer software companies and their retailers, management consultants, independent computer instruction centers, corporate in house training programs

8. Expand your resource network to include high tech people
   Don't get "locked" into conferring only with people in your own field about job opportunities. Make it a point to develop contacts with people from a variety of disciplines.
   Join some new organizations.
   Read trade and professional journals from different fields.
   Attend lectures, seminars, courses, social functions in order to meet people with similar interests.
   Tell people you know and meet that you're exploring new career options for yourself.

9. Interview for Information
   Your best sources of information and your best contacts for jobs are those people who are already employed in the field you are exploring. Make a few phone calls, find out who these people are and then contact them to request 30 minutes of their time. This is called an information interview. It may surprise you to discover how willing even total strangers can be to talk with you about their jobs, their companies and their fields of interest.

   Information interviewing is also an excellent way of finding out how the high tech field is interfacing with your existing specialty. For example: "Can you tell me what software programs your company is developing for nursing applications?" "Can you tell me what your company is doing to promote good relations with its customers?"

ADDITIONAL OPTIONS:

MAJOR CATEGORIES OF COMPUTER SPECIALISTS AND WHAT THEY DO

JOB TITLE	DUTIES	SALARY
Keypunch Operators	enter information into a computer -demand is decreasing	up to $12,000
Computer Operators	run the computer and peripheral equipment and monitor computer operations and output	14,000-16,000
Computer Technicians	install, maintain and repair computer and hardware -"computer doctor"	up to 25,000
Computer Programmers	Write the instructions for the computer to follow.	
Applications Programmer	Specialize in business, scientific and engineering uses. Write instructions in various computer languages (BASIC, COBOL, FORTRAN) to get the computer to perform particular tasks.	up to 28,000
Systems Programmer	Specialize in writing directions for the internal operations of the computer- telling it how to understand different languages and different peripheral equipment	up to 33,000
	Job prospects expected to increase for programmers 102% in next 10 years.	
Systems Analyst	solves problems for the computer user. -ie. what information to collect, what equipment is needed, what task the computer will perform.	up to 37,000
	Job prospects for systems analysts expected to increase 120% in next 10 years.	
Project Leader	supervisor of the entire data processing or computer facility for an organization	25,000-55,000

GUIDE TO NON-TECHNICAL OCCUPATIONS IN THE COMPUTER INDUSTRY

OCCUPATIONAL CODE - R I C S A E IF you have a non-technical occupational code like:	SCHOOL MAJOR IF you have a non-technical background in:	HIGH TECH CAREER OPTIONS THEN you have a future in:
SEA-Social, Enterprising, Artistic SAE-Social, Artistic, Enterprising	Teaching Nursing Sociology Philosophy Counseling Social Work	Promoting Computer Literacy Training - hardware and software usage Education - hardware and software applications Program Development - course design and evaluation
EAS-Enterprising, Artistic, Social ESA-Enterprising, Social, Artistic	Media Retailing Administrative Services Management Real Estate Recreation Hotel/Restaurant Management	Selling the Product - Hardware, Software, Services Retail sales, Manufacturer's Rep. Marketing, Advertising, Public Relations, Customer Service
ASE-Artistic, Social, Enterprising AES-Artistic, Enterprising, Social	English Foreign Languages Journalism Liberal Arts Library Science Fine Arts	Documentation - Promotional and Instructional Literature Writing, Editing, Translating, Research, Printing, Publishing, Illustrating, Designing
ANY COMBINATION	The Professions Architecture Psychology Medicine Law Education Business	Specialty Applications Providing expert consultation on the application of computer technology to specific fields computer graphics, testing, hospital systems, data banks, computer assisted instruction, financial planning